

CLAIMS

What is claimed and desired to be covered by Letters Patent is as follows:

1. A ladder apparatus for providing access to an area over an elevated structure, comprising:
 - (a) housing means secured to the elevated structure wherein the housing means includes a housing mechanism having a proximal end, a distal end, opposing sides, and a central opening disposed between the proximal end, the distal end, and the opposing sides;
 - (b) ladder means pivotally mounted to the housing mechanism, the ladder means including a ladder having a first ladder section and at least one additional ladder section mounted to the first ladder section;
 - (c) first motorized deploying means structured to pivotally displace the ladder to and from a stored configuration and a partially deployed configuration;
 - (d) second motorized deploying means structured to longitudinally displace the at least one

additional ladder section to and from a partially deployed configuration and a fully deployed configuration;

(e) control means structured to operatively control the first and second motorized deploying means; and

(f) a power source providing electrical energy to the first and second motorized deploying means and to the control means.

2. A ladder apparatus as described in claim 1, wherein the housing means includes a housing mechanism having a pivotally mounted cover member dimensioned to cover the central opening as the ladder apparatus assumes a stored configuration.

3. A ladder apparatus as described in claim 1, wherein the ladder includes:

(a) a first ladder section having a first upper surface, a first lower surface, a first proximal end, and a first distal end; and

(b) the at least one additional ladder section mounted to the first ladder section includes:

- (1) a second ladder section having a second upper surface, a second lower surface, a second proximal end, and a second distal end wherein the second ladder section is connected to the first ladder section such that the lower surface of the second ladder section is longitudinally displaceable along the upper surface of the first ladder section, and
- (2) a third ladder section having a third upper surface, a third lower surface, a third proximal end, and a third distal end wherein the third ladder section is connected to the second ladder section such that the lower surface of the third ladder section is longitudinally displaceable along the upper surface of the second ladder section.

4. A ladder apparatus as described in claim 1, including an attachment mechanism structured to pivotally attach the first proximal end of the first ladder section to the proximal end of the housing mechanism.

5. A ladder apparatus as described in claim 4, wherein the first motorized deploying means includes:
- (a) a motor mounting mechanism mounted on the distal end of the housing mechanism;
 - (b) a first motor mechanism mounted on the motor mounting mechanism and having a first output shaft; and
 - (c) a first drive mechanism connecting the first motor mechanism to the first ladder section to operatively displace the ladder to and from the stored configuration and the partially deployed configuration.
6. A ladder apparatus as described in claim 5, wherein the first drive mechanism includes:
- (a) a reel mechanism rotationally mounted to the motor mounting mechanism,
 - (b) a first chain and sprocket arrangement connecting the reel mechanism to the first output shaft of the first motor mechanism, and
 - (c) a pair of opposing first flexible members connecting the reel mechanism to the first ladder section.

7. A ladder apparatus as described in claim 4, wherein the second motorized deploying means includes:
- (a) a second motor mechanism mounted to the first ladder section and having a second output shaft;
and
 - (b) a second drive mechanism connecting the second motor mechanism to the first and second ladder sections to positively displace the second and third ladder sections to and from the partially deployed configuration and the fully deployed configuration.
8. A ladder apparatus as described in claim 7, wherein the second drive mechanism includes:
- (a) a first sprocket mounted on the second output shaft;
 - (b) a second sprocket fixedly mounted on a shaft rotationally mounted to the first ladder section;
 - (c) a drive chain drivingly connecting the first sprocket to the second sprocket;
 - (d) a first rack gear fixedly mounted to and extending the length of the second ladder section;
 - (e) a first drive gear fixedly mounted on the shaft and

- drivingly engaging the first rack gear;
- (f) a first pulley mechanism secured to the second distal end of the second ladder section;
 - (g) a second pulley mechanism secured to the second proximal end of the second ladder section;
 - (h) a second flexible member routed through the first pulley mechanism and connecting the first distal end of the first ladder section to the third proximal end of the third ladder section to thereby positively displace the third ladder section from the partially deployed configuration to the fully deployed configuration as the second ladder section is displaced from the partially deployed configuration to the fully deployed configuration; and
 - (i) a third flexible member routed through the second pulley mechanism and connecting the first ladder section to the third proximal end of the third ladder section to thereby positively displace the third ladder section from the fully deployed configuration to the partially deployed configuration as the second ladder section is displaced from the fully deployed configuration to

the partially deployed configuration.

9. A ladder apparatus as described in claim 4, wherein the control means includes a switch mechanism having a neutral position, a deploy position, and a retract position, wherein

(a) as the switch mechanism is moved from the neutral position to the deploy position:

- (1) the first motorized deploying means is activated to thereby allow the ladder to be displaced from the stored configuration to the partially deployed configuration,
- (2) the first motorized deploying means is automatically deactivated and the second motorized deploying means is automatically activated as the ladder assumes the partially deployed configuration from the stored configuration causing the second and third ladder sections to be displaced from the partially deployed configuration to the fully deployed configuration, and
- (3) the second motorized deploying means is automatically deactivated as the second and

third ladder sections assume the fully
deployed configuration; and

(b) as the switch mechanism is moved from the neutral
position to the retract position:

(1) the second motorized deploying means is
activated causing the second and third ladder
sections to be displaced from the fully
deployed configuration to the partially
deployed configuration,

(2) the second motorized deploying means is
automatically deactivated and the first
motorized deploying means is automatically
activated as the second and third ladder
sections assume the partially deployed
configuration from the fully deployed
configuration causing the first flexible
member to displace the ladder from the
partially deployed configuration to the
stored configuration, and

(3) the first motorized deploying means is
automatically deactivated as the ladder
assumes the stored configuration.

10. A ladder apparatus for providing access to an area over an elevated structure, comprising:
- (a) a housing mechanism secured to the elevated structure, the housing mechanism including a proximal end, a distal end, opposing sides, a central opening disposed between the proximal and distal ends and opposing sides, and a cover member pivotally connected to the proximal end of the housing mechanism and dimensioned to cover the central opening as the ladder apparatus assumes a stored configuration;
 - (b) a ladder, including:
 - (1) a first ladder section having a first upper surface, a first lower surface, a first proximal end, and a first distal end;
 - (2) a third ladder section having a third upper surface, a third lower surface, a third proximal end, and a third distal end;
 - (3) a second ladder section having a second upper surface, a second lower surface, a second proximal end, and a second distal end, wherein the second ladder section is structured to hold the first ladder section

- captive as the second ladder section is longitudinally displaced along the upper surface of the first ladder section, and wherein the second ladder section is further structured to hold the third ladder section captive as the third ladder section is longitudinally displaced along the upper surface of the second ladder section;
- (2) a third ladder section having a third upper surface, a third lower surface, a third proximal end, a third distal end, and a second connecting mechanism structured to connect the third ladder section to the second ladder section whereat the lower surface of the third ladder section is longitudinally displaceable along the upper surface of the second ladder section;
- (c) an attachment mechanism structured to attach the first proximal end of the first ladder section to the proximal end of the housing mechanism;
- (d) a first deploying mechanism structured to operatively displace the ladder to and from the stored configuration and a partially deployed

configuration, the first deploying mechanism including:

- (1) a motor mounting mechanism mounted on the distal end of the housing mechanism,
 - (2) a first motor mechanism mounted on the motor mounting mechanism and having a first output shaft, and
 - (3) a first drive mechanism connecting the first motor mechanism to the first ladder section in order to operatively displace the ladder to and from the stored configuration and the partially deployed configuration, the first drive mechanism including
 - (A) a reel mechanism rotationally mounted to the motor mounting mechanism,
 - (B) a first chain and sprocket arrangement connecting the reel mechanism to the first output shaft of the first motor mechanism, and
 - (C) a pair of opposing first flexible members connecting the reel mechanism to the first ladder section;
- (e) a second deploying mechanism structured to

operatively displace the ladder to and from the partially deployed configuration and a fully deployed configuration, the second deploying mechanism including:

- (1) a second motor mechanism mounted to the first ladder section,
- (2) a second drive mechanism connecting the second motor mechanism to the first and second ladder sections to positively displace the second and third ladder sections to and from the partially deployed configuration and the fully deployed configuration, the second drive mechanism including:
 - (A) a first sprocket mounted on the second output shaft;
 - (B) a second sprocket fixedly mounted on a shaft rotationally mounted to the first ladder section;
 - (C) a drive chain drivingly connecting the first sprocket to the second sprocket;
 - (D) a first rack gear fixedly mounted to and extending the length of the second ladder section;

- (E) a first drive gear fixedly mounted on the shaft and drivingly engaging the first rack gear;
- (F) a first pulley mechanism secured to the second distal end of the second ladder section,
- (G) a second pulley mechanism secured to the second proximal end of the second ladder section,
- (H) a second flexible member routed through the first pulley mechanism and connecting the first distal end of the first ladder section to the third proximal end of the third ladder section to thereby positively displace the third ladder section from the partially deployed configuration to the fully deployed configuration as the second ladder section is displaced from the partially deployed configuration to the fully deployed configuration, and
- (I) a third flexible member routed through the second pulley mechanism and

connecting the first ladder section to the third proximal end of the third ladder section to thereby positively displace the third ladder section from the fully deployed configuration to the partially deployed configuration as the second ladder section is displaced from the fully deployed configuration to the partially deployed configuration;

(f) control means structured to control the first and second deploying mechanisms, including:

(1) a switch mechanism having a neutral position, a deploy position, and a retract position, wherein

(A) as the switch mechanism is moved from the neutral position to the deploy position:

(i) the first motor mechanism is

activated to thereby allow the ladder to be displaced from the stored configuration to the partially deployed configuration,

(ii) the first motor mechanism is

automatically deactivated and the

second motor mechanism is automatically activated as the ladder assumes the partially deployed configuration from the stored configuration causing the second and third ladder sections to be displaced from the partially deployed configuration to the fully deployed configuration, and

(iii) the second motor mechanism is automatically deactivated as the second and third ladder sections assume the fully deployed configuration, and

(B) as the switch mechanism is moved from the neutral position to the retract position:

(i) the second motor mechanism is activated causing the second and third ladder sections to be displaced from the fully deployed configuration to the partially deployed configuration,

- (ii) the second motor mechanism is automatically deactivated and the first motor mechanism is automatically activated as the second and third ladder sections assume the partially deployed configuration from the fully deployed configuration causing the first flexible member to displace the ladder from the partially deployed configuration to the stored configuration, and
 - (iii) the first motor mechanism is automatically deactivated as the ladder assumes the stored configuration; and
- (g) a power source providing electrical energy to the first and second motor mechanisms and to the control means.